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AUTHOR McKnight, Philip C.
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ABSTRACT

Microteaching and the technical skills approach to teacher training began at Stanford University in 1963 as part of a preservice training program. The main skills that emerged from the program and were focused on from 1963-68 were response repertoire, creating student involvement, questioning skills, increasing student participation, and presentation skills. The second phase of the development of the technical skills approach can be characterized as a reexamination of the basic approach to the technical skills, along with the development of several new skills closely related to the examination idea. In the future, work must continue on development of an appropriate research paradigm. (DS)

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DEVELOPMENT OF THE TECHNICAL SKILLS OF TEACHING

1968 - 1978 AND BEYOND

Philip C. McKnight
University of Kansas

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Session 9.02

DEVELOPMENT OF THE TECHNICAL SKILLS OF TEACHING
1968 - 1978 AND BEYOND

Philip C. McKnight

Introduction

The Technical Skills of teaching, an integral part of microteaching, are the focus of this part of the symposium. However, it may be useful initially to show how the skills fit into the original microteaching context in order to provide a proper frame of reference for later observations.

Microteaching is a scaled down but realistic classroom training context in which teachers, both experienced and inexperienced, may acquire new teaching skills and refine old ones. It does so by reducing the complexity and scope of such classroom factors as the number of pupils and the length of lessons (usually 5-10 minutes), and by providing trainees with diagnostic information about their performance immediately after completion of the lesson. Normally, videotaping is part of microteaching because of its perceived value for providing immediate feedback useful to helping the trainee better match his teaching behaviors to learner needs and goals. For this reason, videotaping was a standard part of the early research on microteaching. Indeed, most of the early studies on microteaching dealt with various aspects of videotape usage, focusing primarily on the variables of modeling and feedback.

In a typical microteaching training program, after a Technical Skill of teaching has been described for the trainee by a videotape showing of a master teacher modeling the skill, the trainee's subsequent brief teaching

performance is videotaped and then reviewed under various supervisory and other feedback contingencies. The videotape recordings that were made of the lesson are played back at this time. Following the critique, the trainee revises his lesson and teaches it again, usually to a different group of pupils. The second teaching session is also followed by a critique.

Skill acquisition was measured in the early research on microteaching by frequency counts of the desired behavior across the various teaching occasions. This was valuable to both the trainee and also to the research program in its efforts to define and refine a repertoire of teaching skills. Videotaping was useful to the research because it provided reliable and valid data on teaching performance.

Microteaching and the Technical Skills approach to teacher training began at Stanford University in 1963 as part of a pre-service training program under the leadership of Professors Dwight Allen, Robert Bush and Frederick McDonald. At the end of the initial development period, approximately 1968, the concept had been adopted by many institutions. Ward (1968) found that 176 institutions were using microteaching in their training programs. In the book Microteaching, Allen and Ryan (1969), cite a survey of student teaching programs by Johnson which show that microteaching was being used by approximately 53% of such programs. Further discussions of the various aspects of microteaching training programs and an analysis in the early work in modeling and feedback variables may be found in several sources. Included among them are a report by McDonald and Allen (1967), and an article by McKnight(1971).

Technical Skills Development: 1963-68

Description

The skills discussed here are those which emerged between 1963 and 1968 from the Stanford Teacher Education Program and the research conducted at the Stanford Center for Research and Development on Teaching, particularly that in the Microteaching clinic on the value of modeling and feedback variables. Skills are organized here under the general headings that were chosen for them in the General Learning project by Allen, Bush, Ryan and Cooper (1969). A brief description of each skill is included. Further information may be obtained from the General Learning booklets on the skills, and from sources listed in reports by McKnight and Baral (1969) and McKnight and Bush (1977). The skills are arranged in four basic groups identified as "clusters" by Allen, et.al. In a way, these clusters may be seen as one of the initial attempts to group the skills in some kind of a related way.

A) Response Repertoire: This group of skills is intended to help teachers build a series of discrete skills on the use or nonuse of various verbal and non-verbal responses in order to help convey meaning, nuance, mood, etc. during a lesson:

1) Verbal Responses: This skill, like the other two in this group, was designed to help teachers broaden their repertoire of responses to various classroom situations so they can communicate more effectively. The skill consists of a variety of verbal responses that could be given as alternatives to similar situations. The effect of varying inflections as well as different statements is supposed to help a teacher add a kind of verbal variety to classroom interation.
2) Non-Verbal Responses: These consist of facial expressions, postural positions, gesture, etc., which can be used to convey different

feelings. They can also be used in combination, thereby giving the teacher useful responses to a myriad of classroom situations. It is assumed that non-verbal responses will help teachers become more pedagogically animated, thereby helping students to become more involved with the lesson.

3) Verbal and Non-Verbal Responses: Instruction is given on the various ways of combining the first two skills.

B) Creating Student Involvement: This group of skills was designed to help teachers stimulate enthusiasm on the part of their students by making them more intrinsically interested in their current educational activities. These skills are used to introduce new topics,to present material, to help make smooth transitions, and to help students feel a sense of accomplishment.

1) Set Induction: This technical skill is one of the first used in the microteaching clinic, and along with reinforcement, has probably the most thorough grounding in psychological research. The skill is used to help students establish a frame of reference for subsequent learning, and to help them derive intrinsic motivation from the lesson. It might be said that set induction is a way of helping students establish some relationship between the requirements of present performance and anticipated future rewards so that they become more involved with the lesson.

2) Stimulus Variation: In order to keep students involved with the lesson, this skill shows teachers how to vary their speech, movement, and physical actions in the classroom in order to help keep students attentive and alert. Both verbal and non-verbal techniques, including some of the verbal and non-verbal responses discussed above are to be

used. The skill also includes suggestions for basic changes in pedagogical activity in the classroom such as moving from lecture to discussion or for from lecture to a lab, field trip, etc.

3) Closure: Closure is intended to be more than a summary of a lesson. It is also to help students comprehend the organization of the main ideas and information presented previously in such a way that they can pull together the major points and project them ahead to subsequent work. Along with set induction, it provides a link between past and present work. It is also to be used as a way of reinforcing student learning at the end of the lesson.

C) Questioning Skills: The purpose of this skill cluster is to help teachers develop a repertoire of questioning skills to be used to stimulate discussions and productive thinking of students.

1) Fluency in Asking Questions: Trainees are encouraged to ask as many questions as possible during practice lessons, emphasizing questions that could be answered through memory or sensory descriptions. These questions are not complicated nor is it supposed to be difficult to ask them. Questions that can be answered from memory or sensory description were factual and descriptive. The emphasis is on the number of questions asked, the assumption being that the trainee will ask questions more frequently (to break up lectures, etc.) and will become more sensitive to the need to interact with students to monitor their educational progress. This skill was seen as a prerequisite to the more sophisticated skill of probing questions.

2) Probing Questions: Probing questions require students to go beyond an initial answer in order to explore their understanding in more depth. Probing questions may ask students to clarify, justify,

elaborate upon, etc. initial answers or statements. In this way, students are encouraged to go beyond initial levels of knowledge to refine and strengthen it. Probing questions may be seen as a way of helping students to strengthen understanding on one level of an educational taxonomy before moving to a higher level of understanding, as discussed in --

3) Higher Order Questioning: Higher order questions cannot be answered from memory or simple description. They challenge students to go beyond simple recall to use ideas and information in ways which will raise their level of understanding. A higher order question might require a student to bring together various facts and generalize about them in such a way that would help him go from the level of knowledge or recall to that of comprehension or even ultimately to evaluation and synthesis. The authors of the general learning materials saw higher order questions as asking for six specific functions: evaluation, inference, comparison, application of concepts of principles, problem solving and cause and effect. (Allen, Ryan, Bush, Cooper, 1969).

4) Divergent Questions: These are open-ended questions which usually have no single correct answer. As such, they encourage students to think creatively, hypothesize, speculate, etc. Questions of this type might begin with the phrase, "what would happen if . . .".

D) Increasing Student Participation: These skills were designed to get students more involved with lessons.

1) Reinforcement: This skill incorporates verbal, non-verbal, qualified, and delayed reinforcement as ways of increasing the probability that students would participate in desirable ways. The focus here is on increasing participation as opposed to rewarding academic achievement.

It was assumed that the latter would occur more easily, particularly with inexperienced teachers, if they were able to increase student involvement in lessons.

2) Recognizing Attending Behavior: This skill was designed to help teachers to become more aware of what was happening in the classroom by increasing their sensitivity to cues provided by students through facial expressions, body postures, etc. Such data are seen as indications of students' interest level and attention span, etc. Awareness of such information is important to teachers who must make judgements about the pace of a lesson, the student intellectual activity, etc. In the paradigm of classroom interaction by Snow (1969) to be discussed later, this variable is identified as Cue Discrimination.

3) Silence and Non-Verbal Cues: This skill involves ways of increasing student participation in non-verbal ways, through the use of gestures, facial expressions, etc., to help elicit student response and maintain their participation in the lesson. It is seen as particularly useful to discussions.

4) Cueing: By providing supplementary information and increasing the amount of time a student has to prepare for an answer, the teacher may be able to help direct the student's thinking in such a way that the probability for a successful contribution to a lesson would be increased. Adapted from several characteristics of linear programmed instruction, including the notion of giving the learner helpful cues to guide him in making successful responses, the idea was that the learner would not be permitted to commit too many errors, and that the learner would be given as much time as he needs to respond.

E) Presentation Skills: These skills were designed to help teachers present information and help students develop concepts, which is seen as one of

the most basic skills of teaching.

1) Completeness of Communication: This skill, taught primarily through a series of explanation exercises, was designed to heighten the sensitivity of teachers to the need of listening carefully to students and of responding appropriately to their statements, questions, etc. The exercise involved analyzing results of incomplete communication between students and teachers.

2) Planned Repetition: The purpose of this skill is to clarify and reinforce major ideas, principles, etc. used in lectures or discussions by focussing upon and highlighting their important points and by describing them from different frames of reference. It is based on the psychological principle of over-learning as a way of helping students master material. It is not, of course, seen as mere drill or rote learning. The skill involves such activities as repetition immediately after presentation, spaced repetition at various intervals during the lesson or over several lessons, cummulative repetition of prior concepts in a sequence before presenting new points, and mass repetition, where all important points are repeated together. This summary may occur at the conclusion of a lesson or at other time deamed appropriate. The skill is seen as complementary to set induction, as it encourages teachers to structure learning activities so that students will come in contact with the central ideas throughout lessons.

3) The Use of Examples: Examples help students clarify, substantiate, and verify ideas. Inductive and deductive examples are suggested along with several rules for their use such as progressing from simple to complex examples, the use of examples relevant to students' experience and knowledge, relation of examples to principles or ideas being taught,

asking students to give examples in illustrations of main points and principles, and the use of analogy and metaphor.

4) Lecturing: Related to this skill are those of set induction, varying the stimulus, closure, planned repetition and pacing. The lecture is useful for conveying enthusiasm, synthesizing and reinforcing sources, and reinforcing and conveying information unavailable from other sources. A formal lecture is a one-way verbal communication from teacher to students. The informal lecture involves more dynamic relationships which utilize student questions and comments. Informal lectures incorporate more audio-visual material to enhance the presentation material. The skill of lecturing involves careful consideration of factors such as the audience, preparation of the audience, planning and organization of the lecture, vocabulary to be used, and length of time available.

Rationale for the Technical Skills of Teaching

There are several perspectives on the origin and development of the skills. They reflect the variety of assumptions and approaches which were brought to the development of the skills and which are represented in any discussion of effective teaching behaviors. The different views of Allen and Ryan (1969), McDonald (1973), Gage (1972), and Berliner (1969) are of special note because they were held at the time they were working on microteaching and technical skills ideas at Stanford. It made the period most interesting and stimulating to those of us involved at that time as graduate assistants in the program.

According to Allen and Ryan (1969), the Technical Skills of teaching were developed in order to provide a focus for trainees and their supervisors during microteaching sessions. Those supervisors and trainees (the interns in the fifth year MAT program) had felt that their reviews

of micro-lessons lacked direction and focus and that there would be value in providing something more definite to discuss in their critiques. It seemed logical that there be a focus on teaching skills common to various situations. The impetus came from a concern that interns became acquainted with teaching behaviors in a more productive manner than was normally done in situations where new teachers observed "master teachers" in regular classrooms. This training procedure has been seen by many, including Berliner (1969), as inadequate because it places the novice teacher in a situation where both good and bad teaching behaviors occur and where he must decide for himself, without an experienced colleague, what teaching behaviors should be emulated. This can lead to poor teaching behaviors and the inability to determine between good and bad teaching actions. Further, there is little opportunity to practice teaching behaviors deemed important. Finally, such natural setting observations are often time consuming, hard to schedule, and boring. In short, the experience of the initial microteaching clinic, before Technical Skills were used, indicated that beginning teachers and their supervisors could benefit from a more focussed experience and that along with this, some introduction to appropriate teaching behaviors would be useful as a part of the acclimation period to teaching. The first skill developed at the Microteaching Clinic was that of Set Induction by Horace Aubertine in 1963.

Berliner (1969) reported that in the few years prior to the development of microteaching there were many studies of the value of programmed instruction to meaningful learning. Concepts such as "performance criteria" and "criterion behavior" were used to determine task requirements and learning activities activities, often in military situations. Eventually, these concepts were applied to other kinds of teaching because they were

clearly recognizable by trainees and supervisors, and evaluation of such behaviors could be relatively simple and direct. This thinking was undoubtedly present in the minds of those who developed the early skills of microteaching clinics such as set induction and reinforcement, and continued to be a criterion for the subsequent skills. Reinforcing this notion of specific behaviors was the need to identify teaching behaviors which were easily identifiable and therefore "countable" on videotapes of intern's microteaching performances. This capability was a key part of the microteaching clinic research on modeling and feedback variables. For example, probing questions were developed by Orme (1964) in order to test the comparative effectiveness of training procedures utilizing different perceptual models to help a learner acquire a skill of teaching by observing the performance of another person exhibiting such skill. Based on Bandura's studies (1965), Orme hypothesized that teachers' behaviors could be modified through the use of videotaped model skills without the discrimination of relevant cues and in the absence of known reinforcers. In the studies on modeling, various combinations of live and videotaped models were used in conjunction with alternatives such as written or symbolic models (in Orme's case a complete transcript of the perceptual model's verbal performance).

According to McDonald (1973), the goal of Microteaching and the Technical Skills programs was to help trainees acquire and refine simple teaching skills. After the initial acquisition of the simpler skills, trainees would be acclimated to more complex patterns and integrations of the skills, eventually obtaining the level of the teaching strategy. The effort was designed to "work backward" to teaching strategies. The microteaching context was useful because it provided a greater transfer of training opportunity for the interns. It also made it possible to better identify the decision processes associated with skills. For example, Shavelson's work on decision-making as a skill (1973)

began during his work with the microteaching program. McDonald states that there were to be no validation studies on teaching technical skills until they could be raised to a level of behavior high enough to observe easily. Skills were to be developed with the idea that they could be defined according to what children should do and what the teachers should do to accomplish such goals. In other works, there was to be a class of teaching performances (the Technical Skills) that would lead to certain student outcomes in terms of learning. This tie to expected student outcomes was an important reflection of the change in assumptions about how teacher effectiveness should be defined.

McDonald is more critical than others of the development and the nature of the technical skills. He saw them as "technical" because they were general skills that could be used independently of the content being taught. One of his criticisms about them was that student responses were not always analyzed in the experiments using the skills: ". . . while the data indicates substantial changes in teacher behavior, similar data are not available for changes in student behavior" (1973). McDonald goes on to say that:

> Unfortunately, the concept of technical skills of teaching has been overly promoted and inaccurately described. They are not basic or essential because there are no data to show that a teacher who uses them produces more effective learning. They may have important effects on learning but that remains to be shown. . . Each skill was an observable and easily countable teacher response linked (with some exceptions) to a specified and also easily countable student behavior. These response pairs were thus defined functionally and independently of the substantive character of verbal utterances on the topic of interchange between teacher and student. (p. 55)

This kind of criticism led to the later work on the Technical Skills by Snow (1969) and others that will be described shortly.

Gage's (1972) description of Technical Skills focuses on them as an example of the "micro-criteria" approach to teaching effectiveness research:

> Rather than seek criteria for the over-all effectiveness of teachers in the many various facets of their roles, we may have more success with criteria of effectiveness in small, specifically defined aspects of the

> role. Many scientific problems that have eventually been solved by being analyzed into smaller problems, whose variables were less complex . . . Hence, rather than study teacher effectiveness, and criteria therefor, we may make better progress if we develop 'micro-criteria' of effectiveness. At the very least, such an approach would imply that effectiveness should be sharply specified in terms of subject matter and grade level. (p. 95-96)

In retrospect, Gage's discussion of micro-criteria as it applied to teaching effectiveness and to the Technical Skills of teaching in particular reflects a fundamental shift in educational research from what Gage and Unruh (1967) identified as the Describer Approach to teaching to what they termed the Improver or Active Approach to the improvement of teaching. The authors made the following distinction between the two:

> The long range assumption of describer's is that once important correlates of teacher effectiveness in the present-day classroom have been ascertained, it will be possible to train teachers to be more effective. They take the conventional classroom as given and seek to improve the behavior of teachers in it. To lay the basis for such improvements, they seek the correlates of teacher effectiveness in the classroom . . . the improver's, taking an 'active' approach, attempt rather to 'master the teaching model' i.e., to develop a new model in instruction that will make explicit the manipulable elements and relationships needed to optimize learning. Experimentation will correct and refine the model. (p. 359)

The early work can be seen as an attempt to embody the characteristics of the Improver approach. However, as has been seen in the discussion by McDonald, the first phase of the Technical Skills of teaching development left something to be desired with regard to an underlying model of teaching.

Toward the end of this initial period, there were several attempts to incorporate the Technical Skills into some sort of a larger coordinated unit. The General Learning Project, which has been described earlier, resulted in a clustering of skills. Another was a project conducted by the Far West Laboratory for Educational Research and Development. The project dealt primarily with the adaptation of microteaching for in-service education. The "mini-courses" developed were self-contained so that in-service teachers could acquire some of the Technical Skills of Teaching without benefit of

supervisors, videotape recorders, etc. The courses are packages of materials that include manuals, self-administered tests, films, etc. They may be used with videotape or audiotape recorders and with existing classes. The mini-course skills were based initially on the original Technical Skills of Teaching, but Borg and others have also carried out a fairly extensive research program on the effectiveness of the mini-courses (Borg, Kelly, Langer, and Gall, 1970) which reveals the same revisionary kinds of efforts suggested by Snow (1968). For example, in their book on the mini-course, Borg, et. al., divide the discussion into three parts. The second part is entitled "The Second Generation of Mini-Courses" and the third is titled "The Third Generation and Beyond". Thus, the later mini-course work on discussions encompasses several Technical Skills, such as Higher Order Questions and Probing Questions. (Gall, 1974)

Research Needs: 1968

At the end of this period there appeared several papers which looked ahead to the future development of the Technical Skills, and in particular, at the need to develop an overall framework that would assist in their further research and development. Representative of these efforts was the paper by Richard Snow (1969) entitled "A Second Generation of Microteaching Skills Research". One of the primary concerns cited, along with the need for the framework, was the validation of the skills. Except for the early research done on such skills as Set Induction and Reinforcement in psychological research, little had been done to assess the effectiveness of the skills in terms of student learning and satisfaction. This was seen as crucial because without reputable findings relating teacher behaviors and student achievement and satisfaction, such things as performance based teacher education, evaluation and accountability programs, along with teacher education programs using the Technical Skills, would be discredited. As noted by Berliner (1976)

such ideas appear to many to have been "sold" before they were proven. The problem was stated more forcefully by McDonald (1973), "They [Technical Skills] are not basic or essential because there is not data to show that a teacher who uses them produces more effective learning" (p. 56). Snow (1969) was less critical of the first phase of the Technical Skills development, saying that:

> Its developers never intended microteaching to be a panacea for all the problems of teacher education. It was rather viewed as a first generation task analysis to isolate, understand, and develop elemental performing skills for at least some aspects of the teacher's role ... I am therefore continuing the earlier work rather than criticizing it. I am also, however, setting aside a long list of research questions for which answers are needed if the first generation microteaching procedure is to be optimized (p. 2-3).

The key words here may be "elaborating the skill complex", which is what the second phase has involved. The results of such work, Snow believed, would be a:

> conception of teaching as a complex information processing activity, perhaps better described as an orchestration of skills. Through such efforts, a number of new skills may be defined and added to the list already available from earlier work. Increasingly, however, these skills will be conceived as organized in ordered sequences of complementary skills (p. 15).

It may be noted that Snow's plans for the skills still continued the earlier process-product paradigm. Later efforts would consider other factors such as the classroom environment and the curriculum (Doyle, 1978, Gall, 1977).

Phase II: 1968 - 1978

The second phase of the development of the Technical Skills of Teaching can be characterized as a re-examination of the basic approach to the Technical Skills, along with the development of several new skills closely related to the examination idea. In both cases, the notion seems to have

been that there had to be more global skills developed, accompanied by an overall framework for the skills if they were to become useful. Representative of the efforts with individual skills is that by Gage (1976) on the concept called recitation, which embodied aspects of the earlier skills of Set Induction and Probing Questions. Gage described the skill as encompassing the activities of "structuring" (telling students what is going to happen next), "soliciting" (related to asking questions), and "responding" (students' answers). The recitation strategy is not only comprised of earlier technical skills but it also reflects an overall conception of the teaching process not dissimilar to the paradigm proposed by Snow (Figure 1). Set Induction was also the subject of work by Peterson, Marx, and Clark, 1978) who broke the skill into preactive and interactive components. The work is significant for its attention to relating teacher planning to teacher behavior in classrooms and to student achievement. Further, the work was done in natural settings with experienced teachers. It represents the type of research that Snow and McDonald had recommended earlier.

A more ambitious alternative was suggested by Flanders (1973) who proposed deriving basic teaching skills from an analysis of a model of speaking and listening. (Flanders' skills are basically verbal.) The skills are derived from analyses of the different kinds of speaking-listening transitions.

Several new skills were developed under the Heuristic teaching program at the Stanford Center for Research and Development under the leadership of Richard Snow, who saw Heuristic teaching as adaptive teaching, involving skills such as Cue Attendance (Snow, 1969, Dimmitt, 1969), Inference Generation (Salomon, 1968), and Responsiveness (McKnight, 1971), which combined listening skills with an attitudinal variable in training. Another skill, decision planning, indicated the direction which the Technical Skills were to take

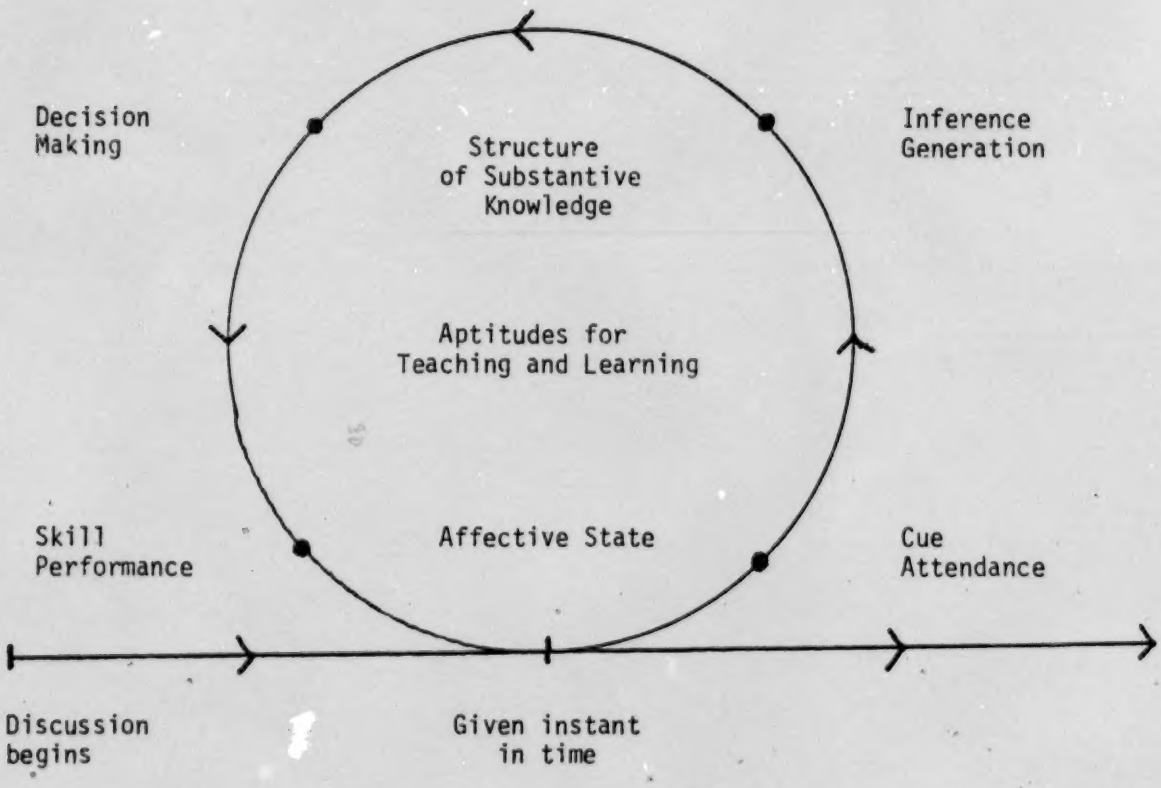

Figure 1: Cyclical Model showing cognitive events and variables involved in teaching performance. (Snow, 1969)

in what Snow called the Second Generation of Technical Skills, but for reasons discussed later, I believe that the work does not so much build upon the first phase efforts as it attempts to place them into a theoretical framework relating them to one another and to a central model of the teaching process. McDonald (1976) wrote that the next phase of Technical Skills development should attend to such variables as subject matter, grade level and instructional materials. The factors of a theoretical framework that McDonald suggested would include 1) how teaching is organized and 2) how materials are used, as he sees material selection as a skill in itself, perhaps analogous to, or part of, the earlier skill of Set Induction. Snow embodied these factors and others in a paradigm of the teaching process (Figure 1) to reflect his belief that " . . . teaching consists of a structured sequence of behavioral and cognitive events."(p. 3). Note that Snow's paradigm relates the skills of teaching and accounts for the influence of such variables as the teacher's knowledge, his aptitude for teaching, his affective state, etc. Included here also would be McDonald's notion of the importance of subject levels and materials.

In addition to the second generation of skills paper, Snow also prepared, with Baral and Allen (1968), a paper on "A Taxonomy of Teaching Behavior: A Progress Report". The project was directed towards development of a more useful classroom observation system, but it also addresses the issue of an overall model of teaching effectiveness and the importance of systematic research and development of teaching skills. This can be seen in the fact that the taxonomy project began as only an effort to revise the Stanford Teacher Education Program Appraisal Guide, an evaluative instrument used with interns in the MAT program. It went beyond that goal to one of developing a language for the analysis of classroom behavior.

The importance of teacher's cognitions in microteaching and Technical

Skills acquisition has been explored recently in a series of studies conducted and reviewed by McCleod and McIntyre (1977). They suggest that microteaching might be regarded as a way of influencing cognitive structures that are important in teaching. Such intellectual predispositions may offer teachers simple and effective guides to govern their behavior in the interpersonal dyads which occur in their classes each day. This is similar to the work of several other people, including work on the decision-making skill by Shavelson (1973), who sees it as the most important skill of teaching. The skill can be seen in Snow's paradigm as step three. Shavelson's decision-making skill is based on the belief that knowledge of individual skills of teaching such as the Technical Skills is not enough. Along with them, and in fact more basic than any of them, is the ability to decide when to use them:

> The teacher as decision maker incorporates previous research on basic teaching skills. Skills such as questioning and explaining represent the teacher's repertoire of alternative acts from which to choose, while skills such as listening and hypothesis generation influence the quality of information from which the teacher estimates the student's understanding and the utility of alternative acts. (iii)

The notable thing about this view is that it assumes the need for a way of relating teaching skills (in this case, listening and questioning) and proposes a way of doing so through the "basic" skill of decision making. Shavelson's decision-making skill is another way of addressing the need for a framework for the Technical Skills of Teaching. This may be seen in Shavelson's revision of Snow's paradigm (Figure 2) where he relates specific teaching skills. Shavelson's skill itself is an example of a second generation of skills with greater theoretical and research support, in this case, than that of Miller, Galanter and Pribram (1960) on decision theory.

In helping the teacher choose the appropriate teaching skill at each classroom interaction juncture, the skill of Decision Making encompasses them all. In doing so, however, it becomes vulnerable to presenting a dysfunctionally

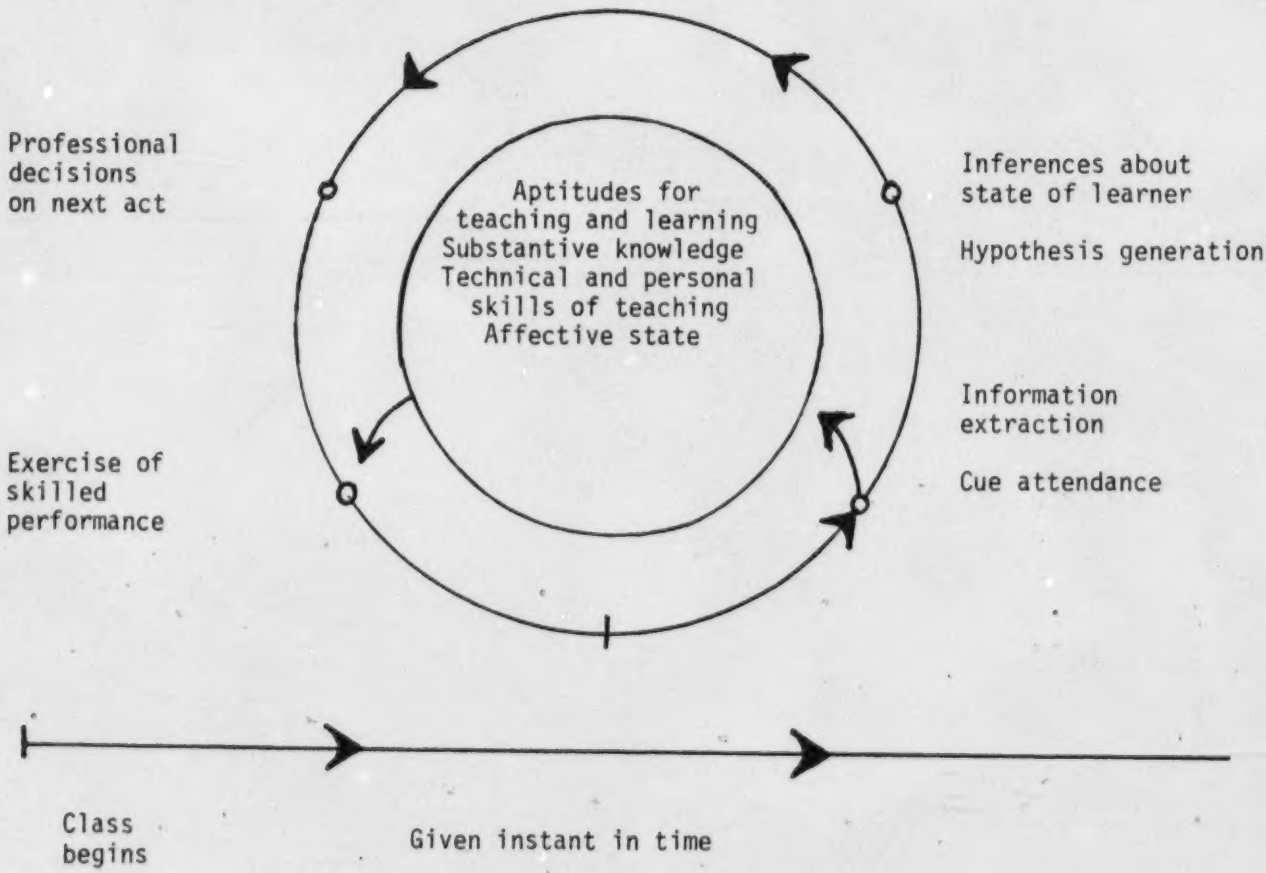

Figure 2: Temporal course of teacher-learner interaction (based on Snow, 1968).

complicated sequence of decisions to teachers. This points to the problems involved with providing the teacher with a comprehensive paradigm of his or her work that is manageable. It may be that experience is the key to being able to handle complex orchestrations of skills and strategies. MacLeod and McIntyre (1977) explain this effect of experience in terms of Jackson's (1968) "conceptual simplicity" which teachers acquire as a way of tolerating the complexity of the classroom and, perhaps also, the complexity of instructional variables. They believe that microteaching, including the Technical Skills of Teaching, helps trainees acquire such conceptual simplicity.

> Microteaching can be seen as a means of producing changes in one's cognitive activities while teaching, changes in the ways one construes the courses of action open to one and the effects of one's actions, with its prescribed role being to provide for the development and induction of functional and adaptive cognitive structures. (p. 119)

Citing Bartlett (1932), McLeod and McIntyre believe that microteaching provides trainees with cognitive structures which provide ways of escaping from the "complete sway of immediate circumstances" and means of matching infinite"diversity by increasing delicacy of response" (Bartlett, 1932, p. 301 in McLeod and McIntyre, 1977, p. 119).

In sum, the last ten years of research and development of the Technical Skills have shown that there has not been widespread development of the original list of skills. Work by Gage (1976) and Peterson, et.al. (1978) related to set induction and the work by Berliner (1976) on probing questions may be the closest to significant work with the skills as originally conceived. A review of the literature in a recent bibliography on microteaching by McKnight and Bush (1977) does not reveal any significant work on the skills. The work of Gage, Berliner, Snow and particularly that of Shavelson, reflect the trend towards a reconception of the skills, as do the reports of various conferences and symposiums in recent years, including the 1975

instructional conference held at the University of Texas involving many of those mentioned here (Journal of Teacher Education, 1976). The book published by Gage in 1972 entitled, Teacher Effectiveness and Teacher Education: A Search for a Scientific Basis, and a more recent work entitled, The Scientific Basis for the Art of Teaching by Gage (1978) also reflect this trend.

To this point, it appears that most of the recent work has stayed within the process-product paradigm, but there may be attempts to integrate the process-product paradigm with one emphasizing the "implicit human processes that mediate instrumental stimuli and learning outcomes" (Levie and Dickie, 1973, p. 877), or alternately, with an ecological paradigm to account for student response variables in classroom environments (Doyle, 1978). Other possible classes of variables are considered by Winne and Marx (1977), and include aptitude-treatment and anthropological factors. Dunkin and Biddle's (1974) paradigm encompasses these and other classes of variables. Also, the insights provided by Kuhn (1962) in The Structure of Scientific Revolutions should be of significant value.

Phase III: Looking Ahead

Most importantly, work must continue on development of an appropriate research paradigm for the Technical Skills of Teaching. This area is perhaps the most crucial. It reflects, as does all work on teaching effectiveness, the need for the kind of systematic, coordinated and additive research discussed earlier. Assuming that recent or forthcoming paradigms will provide the kind of useful orientation described by Kuhn and others, there are several topics which should be explored. Given some tentatively agreeable conception of how these technical skills might be related, the work on the Technical Skills should continue to validate their effectiveness in terms of

learner achievements, and to adapt them to various instructional modes. Development and adaption of the skills might be facilitated by showing how the various skills can be related according to a classification scheme which might, for example, include affective-cognitive, temporal, and occasion-specific/molar dimensions (Figure 3).

Or, an elaboration of Snow's paradigm may be in order to recognize more than process-product variables. In addition to method, it may be necessary and possible now to account for curriculum objectives and materials, students and specific instructional settings. Research generated on this basis might, according to Gall (1977) make it easier for researchers to interpret and apply the results of experiments on teaching skills.

After a useful paradigm has been developed, attention could return to the skills. For example, it might prove useful to develop a group of Technical Skills of Learning (McKnight, 1974) to complement or extend those of the teacher because classroom interaction requires a dynamic relationship between teacher and student. Such skills could themselves be divided into pedagogical (related to children) and andragogical (related to adults) learning skills (Knowles, 1970).

Related to microteaching are questions about the amount of time and the kind of setting needed for acquisition of the skills. For example, should they be acquired in a nurturant setting only as in the microteaching clinic described earlier and then adapted through focused practice in a school setting? Or can we begin to train new teachers in more natural settings? What length of time should be set aside for their acquisition? It is possible that a one-year internship or student teaching experience, let alone three months of summer time, are not enough. An alternative to the present system might be that proposed by Bush dealing with the externship which allows a two or three year period of consistent supervisory help.

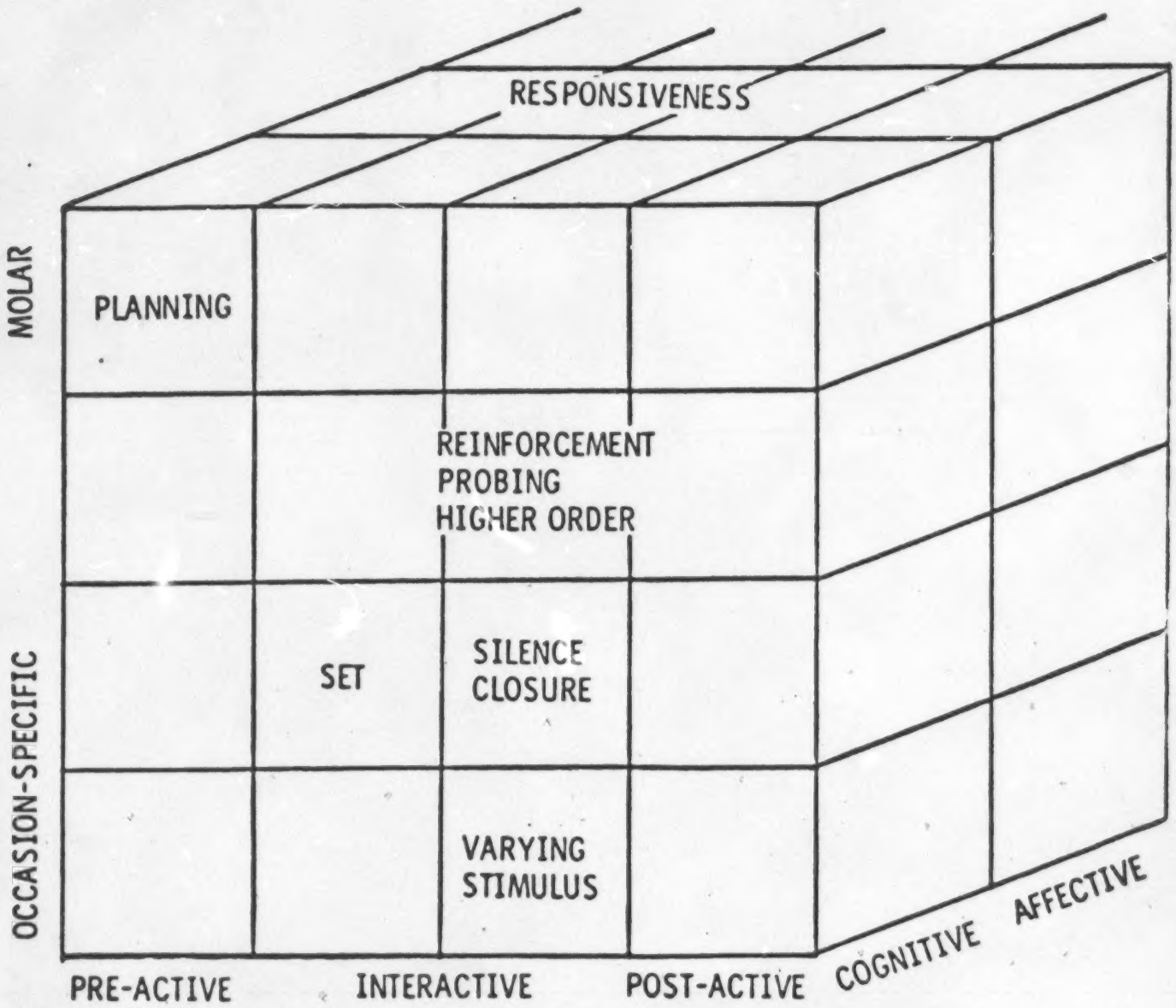

Figure 3: THREE DIMENSIONAL CLASSIFICATION OF THE TECHNICAL SKILLS OF TEACHING

With regard to the pre-service training, and to a certain extent in-service training, the role of the supervisor in the acquisition of Technical Skills of Teaching has never been fully studied. It was studied intensively as it dealt with initial acquisition of skills in the modeling and feedback studies, but it has not been studied as it relates to the further development and adaptation of skills.

The notion of aptitude treatment interaction is still a viable one in American education, and it has an effect on the Technical Skills of Teaching. We assume now that each student teacher can benefit from all the skills and perhaps an initial understanding of each is useful. But if we ever intend to seriously move towards aptitude treatment interaction through differentiated staffing, flexible scheduling, etc., the Technical Skills training would be affected by such decisions. (Perhaps training in the skills is a way to help people identify what they do the best, therefore helping to make differentiated staffing a reality in itself.)

Each of these areas is worthy of study, but in the order of priorities, attention to a useful paradigm must come first, and it appears that there is widespread support for integrating several more classes of variables. Such expansion may complicate research, but it would utilize promising research from other domains. Thus, an adequate framework of the Technical Skills of Teaching is seen as a prior condition to further research and development of the skills to provide a useful integration of them and to reach greater validity for each of them in a variety of instructional setting.

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